REASONS FOR REVERSAL OF FINAL REJECTIONS

Claim Rejections -- 35 U.S.C. 103

Applicants request reversal of the obviousness rejections of claims 2-4 under 35 U.S.C. § 103(a) over JP 2003-512147 (Assignee: Hollingsworth & Vose Air Filtration Ltd.; hereinafter referred to as "Collingwood") in view of JP 2002-348480 A (hereinafter referred to as the '480 reference).

Collingwood discloses an electrostatically charged filter material comprising polyester fibers and electrostatically chargeable fibers of at least one other kind (abstract; column 1, lines 44-47). Preferably, the filter material of Collingwood consists of a blend of polyester fibers and polyolefin fibers, such as a 50/50 blend of polyester and polypropylene (paragraphs [0008] and [0019]). As conceded by the Office Action, Collinwood fails to disclose a filter material comprising at least 20 mass% polyester fiber containing a phosphinic acid compound and/or sulfonic acid compound, and at least 30 mass% of polyolefin fiber, according to claim 2. In other words, the polyester fibers in the filter material of Collinwood are general polyester fibers, not the specific type of polyester fibers wherein a phosphinic acid compound and/or sulfonic acid compound is copolymerized with a polyester molecular chain.

The '480 reference fails to cure the deficiency of Collingwood. The '480 reference discloses a polyester fiber containing a copolymerized phosphinic acid compound, wherein the polyester fiber has fire retardancy (paragraphs [0005]-[0007]). The Office Action took a position that it would have been obvious to replace the polyester fibers of Collingwood in Collingwood's filter material, with the '480 reference's polyester fiber compolymerized with a phosphinic acid compound in order to increase the fire retardancy of Collingwood's filter material.

Collingwood discloses an electrostatically charged filter material comprising general

polyester fibers and fibers that can be charged with electric charges. Collingwood does not describe the polyester fibers as electrostatically chargeable fibers. Because the polyester fibers containing a copolymerized phosphinic acid compound of Toyobo can be charged with electric charges, an ordinary skilled in the art would modify the filter material of Collingwood by replacing the fibers that can be charged with electric charges with the polyester fibers of Toyobo. As such, the modified filter material would comprise general polyesters, as disclosed by Collingwood, and polyester fibers containing a copolymerized phosphorous compound, as disclosed by Toyobo. This would be different from the claimed filter material comprising polyolefin fibers and polyester fibers that contains a phosphinic acid compound (and/or sulfonic acid compound).

There is another reason why the obviousness rejection should be withdrawn. At the time of filing, a person of ordinary skill in the art would know that (1) the polyester fiber containing a copolymerized phosphinic acid compound disclosed by the '480 reference is an electrically chargeable fiber having good fire retardancy, (2) the polyolefin fiber in Collingwood's filter material functions as an electrically chargeable material, and (3) polyolefin fibers in general are more flammable than polyester fibers because polyolefin fibers generally have a lower Limiting Oxygen Index than that of polyester fibers. As shown in the attached article, *physical Properties of Plastics*, the Limiting Oxygen Index (LOI) value of polyolefin is 17-18% and the LOI value of polyethylene terephthalate (PET) is 21%. These values show that polyolefin is more flammable than ordinary polyester (e.g. PET) since fibers having a low LOI value is generally understood to be more flammable. Thus, in order to improve the fire retardancy of Collingwood's filter material, the person would NOT replace the polyester fiber in Collingwood's filter material with the polyester fiber containing a copolymerized phosphinic acid compound disclosed in the '480

reference. Instead, the person would have been motivated to replace the polyolefin fiber in Collingwood's filter material with the polyester fiber containing a copolymerized phosphinic acid compound disclosed in the '480 reference. In other words, the filter material resulting from the modification motivated by the prior art knowledge would differ from the filter material of claims 2-4 because the filter material resulting from the modification would not contain any polyolefin fiber.

Furthermore, there are many methods of improving the fire retardancy of filter materials. For instance, the person would modify the filter material of Collinwood by replacing the polyolefin fiber, which has a lower LOI and more flammable than the general polyester fiber in the filter material of Collingwood, with fibers having high LOI values listed in the attached article, such as polyamide/imide, polybutylene terephthalate or nylon 6 which contains no halogen. In other words, it would be a more efficient way to achieve fire retardancy by replacing the polyolefin fibers having a lower LOI value than replacing the general polyester fibers having a higher LOI value in the filter material of Collinwood with less inflammable fibers. By replacing the polyolefin fiber in Collingwood's filter material with fibers made of polyamide/imide, polybutylene terephthalate or nylon 6 which contains no halogen, the resulting filter material would be different from the filter material of claims 2-4.

Collinwood discloses a filter material comprising a blend of polyester fibers and electrostatically chargeable fibers of at least one other kind (see paragraph [0006] of the English translation attached to the Office Action dated June 26, 2009), which shows that polyester fibers are an essential component in the filter material of Collinwood. This is supported by the teaching in Collinwood of replacing the polypropylene fibers, but not replacing the general polyester fiber, with other types of fibers. Therefore, a person of ordinary skill in the art would

not have been motivated to replace the general polyester fibers in the filter material of Collinwood with the polyester fibers of The '480 reference that contains a copolymerized phosphorous compound.

Furthermore, Collinwood and the '480 reference fail to teach or suggest the specific amounts of the polyester fibers containing a phosphinic acid compound and the polyolefin fibers, as recited in present claim 2. The claimed friction-charged filter material with the recited ratios is self-extinguishing and exhibits high levels of electrostatic charges and high efficiency of particle collection (page 3, lines 6-10). For example, in Comparative Example 3, the ratio of NC (a polypropylene fiber)/707 (a general polyester fiber) is 60/35 and the content of fiber A (a polyester fiber containing a copolymerized phosphinic acid) is 5% (see page 20, line 21 to page 21, line 9, Production Example 1; Table 1). This is equivalent of replacing 5 parts of the general polyester fibers with copolyester PE fibers containing a phosphinic acid compound in the filter material of claim 5 of Collinwood wherein the non-PE fiber/PE fiber is 60/40. But the efficiency of collection of 0.3 μm particles of the fiber of Comparative Example 3 was only 48%. Furthermore, exchanging 70 parts of the general polyester fibers with copolyester PE fibers containing a phosphinic acid compound in the filter material of claim 5 of Collinwood wherein the non-PE fiber/PE fiber is 20/80 would result in a filter material which, although self-extinguishing, has an efficiency of collection of 0.3 μm particles of only 35% (see Comparative Example 4). Therefore, one of ordinary skill in the art would not have been motivated to replace the general polyester fiber of Collinwood with the polyester fiber copolymerized with a phosphinic acid of The '480 reference. Also, the Examples and Comparative Examples of the present application demonstrated unexpected superior result associated with the specific amounts of the polyester fiber containing a phosphinic acid compound and the polyolefin fiber, as recited

in present claim 2.

In addition, without conceding that the Office Action has shown that the claimed filter material would have been *prima facie* obvious, applicants note that the specification of the current application demonstrates that the claimed invention can achieve unexpected results compared with the prior art filter material. The filter material shown in Comparative Example 2 in the table of page 25 of the specification had 50/50 general polyester and polyolefin. The filter material of Comparative Example 2 had an collection efficiency of merely 59. In contrast, the filter material of Example 1 (containing 50 mass% of a polyester fiber containing a phosphinic acid compound and 50 mass% of a polyolefin fiber) had a unexpectedly higher collection efficiency of 85. The unexpected results would overcome the *prima facie* obviousness, if any, over Collingwood in view of the '480 reference.

For at least these reasons, the obviousness rejections should be reversed.